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ABSTRACT

This report describes the beginning of a school district's involvement in the use of microcomputers in the classroom, and one teacher's experiences with microcomputers in a junior high school setting. Background information is given on how the district financed its initial computer investment, approaches the district used to encourage teacher involvement with computers, and an analysis of microcomputer applications in an English class, in writing a school newspaper, and in a program for the academically gifted. Strategies for initiating teacher involvement and managing student enthusiasm over a 2-year period are presented, as well as suggestions for using microcomputers in writing programs. (MER)

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PERSONAL EXPERIENCES:

USING MICROCOMPUTERS IN A JUNIOR HIGH SCHOOL HIGH-POTENTIAL PROGRAM

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

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Based on my experiences in my classroom rather than on a formal study, my comments today will provide another perspective for you.

Basically I teach English at West Junior High School, a school of about 985 seventh, eighth, and ninth graders, in the Hopkins School District, a district of about 7600 students. Hopkins is a western suburb of Minneapolis, Minnesota.

In addition to teaching English for the past 13 years, I have also taught the class which produces our school newspaper, I have taught a couple of reading classes, and, for the past two years, I have been the coordinator of the gifted/talented or high-potential program in my school. This high-potential program is called the CHALLENGE Program.

With this background, how did I ever become interested in or involved with computers?

Currently, I use computers in all three areas for which I am responsible; I use them in the newspaper class, in my English classes, and, of course, in the CHALLENGE Program. It is the CHALLENGE Program to which I owe the most credit for my initial involvement with computers. Once several highly capable, highly motivated students started working on computers, I had to learn

more and more so that I could communicate with them. In the course of this learning, I discovered that COMPUTERS ARE FUN! It didn't take long before I was hooked.

I. Equipping Our District with Computers

But let me go back to the beginning in my school district.

Like many other school districts around the country, enrollment in our school district is declining. We have closed a junior high school and several elementary schools. We have another elementary school due to close in the coming school year, and we will probably close another secondary school in a few years.

How then can we afford to invest in microcomputers?

In Minnesota, the money allocated to our school district is divided into two distinct categories--capital outlay and general operating funds. Money can not be transferred from one category to the other. Capital outlay, in the past, was primarily used for building construction and major renovation to existing buildings. With enrollment declining, however, there has not been a need to build. Therefore the money which is already allocated for capital outlay can be diverted to major equipment purchases. Major equipment for us has been microcomputers. The inability to transfer capital outlay money to the general operating fund, a factor that has been a disadvantage for us when we have wanted to get better salaries or books for our classes, has become an

advantage when we want to purchase microcomputers. I know that this particular method of allocating money for education is common in midwestern states but not necessarily nation-wide. It is, however, one possible method of financing computers and worth exploring.

There are other ways to finance computers. In my school, our SLBP (Slow Learners/Behavior Problems) Department will have its own computer and printer next year because of Federal and state funds available to them. Grants are also available. Watch for opportunities presented in computer magazines and educational publications.

Before choosing a specific brand of microcomputer for our district, we, as a school district, listed our criteria and studied several varieties of microcomputers. We wanted microcomputers that were relatively kid-proof, ones with separate monitors and disk drives for maximum flexibility, ones with retail and repair services in or near our district, and ones that were compatible with our time-sharing computer system. We decided on the Apple microcomputers.

Initially, two years ago, we purchased 17 computers. One computer was "permanently" assigned to each of our ten schools, two were assigned to our evaluation center, and five "floating" computers were moved from school to school on a sign-up basis.

In my school, our "permanent" computer was located in a small room adjoining the library/media center. Students were allowed to sign

up for twenty-minute time periods during their study periods. The computer time could be used for running programs for various subject areas, or, more commonly, for playing games.

To be sure, much of the computer time in the library during that first year was spent playing games. Even this game-playing allowed many students to become familiar with the microcomputers. There was seldom a twenty-minute time segment without students eagerly waiting for a turn at the computer. And most of the games they played really were educational. The disks that contained games like Pong and spaceship shoot-out games were conveniently misplaced; the students had to choose games like state identification, Oregon Trail, speed reading, state capitals, spelling, typing, and various science and social studies simulations. But since they really just wanted to use the computer, they played anything!

II. Opportunities Provided by School District to Encourage Involvement

During the early part of the school year, the administration took what I consider a crucial step in getting some of us teachers interested and involved.

All of the "floating" computers were placed in our building for a three-day period. Everyone on the staff--teachers, aides, and secretaries--was told to sign up for an Introduction to Microcomputers session that would take the place of our monthly

faculty meeting. The sessions were held during preparation periods, and since the sessions took the place of a faculty meeting, it did not seem like an extra assignment.

During that session, we were taught how to turn on the computers and how to run ready-made programs. We were given several programs in our own subject areas to whet our appetite. Naturally, the programs used a lot of color graphics and sound to be even more appealing. We were also given lists of available programs in our subject area or other subject areas in which we were interested.

For those of us who were immediately fascinated, a second opportunity soon was offered--a no-cost in-service class in Beginning Applesoft Basic, the main language used in programming the Apple microcomputers. Later in the year, Intermediate Applesoft Basic was also made available at no cost.

And as a final temptation, we were encouraged to "check out" our school's computer for weekends and vacations. I think this opportunity to take computers home has done the most to increase teacher interest.

The no-pressure, gradual introduction to computers has been much more well-received by our faculty than other programs that have been forced upon us.

This year we have added 31 computers to the original 17 giving us 48 microcomputers in the district. My school has 10. We have six

in each of our two high schools, five in the other junior high school, and at least two in each elementary school.

In my school we no longer have a computer in the library--rather all ten computers are taken from classroom to classroom on a sign-up basis.

III. First Year's Involvement

I will now briefly trace my own involvement.

I went to the initial preview session in my school with no special interest. I was fascinated by the first session and went back for more.

As soon as the opportunity presented itself, I signed up for the Beginning Applesoft Programming course. I followed up as soon as possible with Intermediate Applesoft Programming. By then I was buying and reading everything I could about microcomputers. Only my family, my other teaching responsibilities, and time kept me from becoming totally absorbed.

Several times I took the computer home for the weekend--and vacations. I signed up for spring break right after Thanksgiving! Throughout our somewhat cool Minnesota winters, envious students helped me load the computer, TV-monitor, and disk drive into my car. At home, however, I had to share my time with my husband, relatives, and friends who mysteriously found out just when I had the system home. I knew it was only a matter of time before we

invested in our own microcomputer. (We finally did get our own Apple about two months ago.)

IV. In the Classroom

But how long did it take before I felt comfortable having the computer in my classroom?

Due to the popular use of our "floating" computers, it was last spring before I was able to work with students on more than running ready-made programs.

As coordinator of the CHALLENGE Program, I thought that I already had a group of students with which to begin.

My intent was to teach these students how to do their own programming. I knew that I was no expert, but I did know the basics. I also knew that the students with whom I would be working would probably be able to figure out many of the things that would perplex me.

As CHALLENGE coordinator, I had one 38-minute period per day to devote to CHALLENGE students. In addition, I could periodically schedule a substitute teacher for my newspaper class and my three regular English classes. I estimated that I could probably miss about four days of my newspaper class during May without hampering the preparation of our end-of-the-year publication. I therefore ordered the five available computers for as much of May as I could

get them.

I then had to consider the problem of adding five computers to an already-crowded classroom. My room is quite small. It was designed for the small-group-discussion type of classes. Unfortunately, in the past several years those small groups have averaged 28 to 30 students. Besides 30 student desks and one teacher's desk, my room contains two large storage cabinets, three four-drawer files, three movable bookcases, one three-drawer file, two large tables, several typewriters, and several chairs. Where would I put five computers?

For the first two weeks of May I could only get two computers; so it was fairly easy. I built a computer corner in my room by using the filing cabinets. I arranged the computers behind them--out of sight of my regular students.

My rather secluded computer corner gave me the courage to invite interested students to work on the computers even though I was conducting regular classes.

AND IT WORKED!! At first there were some snickers whenever the Apple beeped, but soon my regular students just ignored the strange noises.

Those first computer users in my room were strictly game players. But many of my CHALLENGE students had never even played games on the computer, so I thought it was time well-spent.

It only took a couple of days before I realized that I needed a sign-up sheet to allocate time.

Students in my school have, on the average, one 38-minute study period per day. The usual choices for this time period are language arts, math, or social studies resource centers, the library--a quiet study area monitored by science teachers, or a physical activity. Many were now choosing to come to my room to "work" on the computers. It wasn't long before some of my CHALLENGE students were coming to my room two and three times a day. It seems they were very gifted at convincing some of their teachers that working on the computers was more important than English, art, math. . .no class was safe if a student knew there was an open computer.

At that time I did limit the computer involvement to the students in the CHALLENGE Program. There were many others interested, but I knew I couldn't even satisfy the requests from CHALLENGE customers. I turned away many interested students.

Then came the last three weeks of the year when I could have all five computers. I needed a new plan.

I immediately stopped all game playing on the computers in my classroom and only allowed students to work who were interested in learning how to program the computers.

I also needed materials.

I contacted those who had taught the programming classes for teachers and received permission to use their materials with my students. These materials had been developed by the one person hired by our district to coordinate computer use with the help of an extremely interested elementary school teacher. These materials were very good for junior high students because they were basically self-teaching, and they provided problems interesting enough to keep the students' attention. In all, there were five lessons in Beginning Applesoft Basic.

Originally, the first lesson was designed to teach the process of creating flowcharts, but I quickly realized that junior high students just wanted to get their hands on the machines. So I delayed the flowchart lesson until the students were ready for "intermediate" programming. Session one started with the students right at the computer.

The first lesson began with turning on the system and using the computer in immediate-execution programs--in other words, using the computer as a calculator and typewriter. This part used only a simple PRINT command.

Quickly the lesson moved into deferred-execution programs. The first program the students were asked to type into the computer used a simple GOTO command forming a loop which caused the student's name to fill the screen. That really got their attention! When they learned how to SAVE their own program, they were usually hooked.

At this point some of the more perceptive students were already changing the suggested programs to print what they wanted. It was also at this point that my "no obscene language is to be programmed" speech needed to be delivered to a few creative students.

The lessons progressed with a mixture of activities. In some of them, students copied suggested programs to discover what various commands and symbols do when in a program. Then to see if they were understanding what they were doing or if they were just becoming accurate typists, program changes were suggested. Some students quit at these points. They could copy programs, but they could not figure out how to change them to solve new problems.

It became apparent to me that in learning to program, the students were growing in other ways.

Several of the junior high students, not known for their patience, began to discover that they had patience--if they really wanted to use it. It took patience just to type. Typing is not offered to students until they are in high school in my district, so they used the "hunt and peck" method. Some of them became quite proficient.

In addition, the dozens of SYNTAX ERROR and other error messages made the students go back and redo their work. Many of these students were English students of mine--if only I could have convinced them to redo their compositions as easily. And in programming, they had to spell correctly!!

The students also had a real motivation to find and correct their errors. They simply wanted their programs to work! They quickly learned to be precise and accurate in their work.

Problem-solving skills were also increased. Students would have a goal in mind and try to achieve it by fitting together elementary statements. The development of a program from start to finish exercises logical thinking--in fact, the entire range of problem solving skills.

Once a student "finished" a program, invariably he or she would think of methods to improve it, to elaborate on it. Seldom does a student in my English classes get so excited about improving or adding to a theme!

At the end of the first lesson, the students were finally given instruction in caring for the computers and disks. By allowing the students to get their hands on the computers as quickly as possible, I think they paid more attention when we finally stopped them to say, "You really have to know how to take care of this equipment."

Lessons two through five introduced more BASIC commands and provided the students with more and more complicated problems to solve.

Many students were able to work through the entire five-lesson course in the two to three week period. Since this was near the

end of the school year, many of these students were able to convince teachers that they were finished with their work or they didn't need end-of-year reviews but rather their time would be better spent working on the computers. Some students spent over half of their days in my room those last few days of school.

To enable the students to get a good start and to get through the first lessons when I had plenty of time to help them, I arranged to have a substitute teacher for three days. I also arranged to have that substitute teacher meet my regular classes in a different classroom. That gave me the time and space necessary to get maximum involvement.

Then the hard part. I had to make a time commitment. In fact, I became a recluse in my classroom. I had no specific time periods that I could call students to my room. I had to work around their schedules. I knew that if I took my regular preparation periods and ate my regular lunch, some students would have no opportunity to try the computers.

Since it was so close to the end of the year, I decided that I could survive ten straight hours of "computer kids."

How was it ten hours? I had students so interested that they were at school to meet me when I arrived at 7:30 so they could get in an hour on the computer before school. I worked in my room with the students through my preparation periods. I ate lunch at my desk. And when the bell rang to end the day at 3:05, students were rushing into my room to make sure they got a computer. I

found I even had to schedule users during the after-school hours. At 5:30 when I insisted I just had to leave, I often had to unplug the computers to get them to leave!

On the days that I had a regular teaching schedule, I would allow students to work on their programming in my classroom--as long as they promised not to interrupt my teaching to ask questions. They had to figure things out for themselves or save their questions for the end of the class periods.

At first my regular students watched them more than they watched me, but since there were mostly just words on the screens, they soon grew bored of watching and virtually ignored the computer operators.

If it had been early in the year, I could never have kept up the pace! But in the last weeks of May, anything is possible.

On the first two days that school was out for summer vacation, when teachers still had to report, I found my room still full of "computer kids" trying to get just a little more done.

Needless to say, it was an exhausting end-of-the-year.

V. Second Year of Microcomputers

In June I packed up and went to England to spend the summer. While there I visited many schools since the purpose of my trip was to study British education. As I saw no computers in use in the British schools that I visited, I returned to school in August not having seen a microcomputer since the previous June.

During the first day of workshop in August, our media specialist came to me to ask my assistance in unpacking our nine new Apples. I was bribed by the promise that one of the new computers would spend some time in my classroom--at least to begin the year. By the afternoon of the first workshop day, two of my "computer kids" from the previous year discovered that there was a computer in my room, and they volunteered to "check it out" for me to make sure it worked.

Both of them had taken a summer school course in our district which had been offered for gifted/talented students. That course had enabled them to get quite far beyond me in their knowledge of programming.

I knew I needed new strategies for the new school year.

I began the year in much the same way I finished the previous spring. I allowed students to come into my classroom during their study periods. The ones who wanted to continue on the lessons from where they had ended the previous spring were encouraged to do so. Others were encouraged to create their own programs.

Our school had also hired an aide who was assigned to computer scheduling as part of her job. I informed her that I would be glad to use any computers that were not requested by other teachers--and I would like to have one or two computers as much of the year as possible. She was actually relieved because there were not too many early requests, and there was no good place to store the computers. My room quickly became "the computer room."

During the second week of school I had from six to eight computers in my room. It has continued that way throughout most of this year. They occasionally leave when the home economics or science or some other department wants all ten computers, but 90% of the time I have had at least six computers.

I no longer have a "computer corner;" now the computers line two and sometimes three sides of my classroom.

I still teach regular English classes. Last fall, my seventh graders were extremely excited when all the computers appeared in my room, and I knew that I had to get them used to the idea of having them there. I began to use available programs in spelling and grammar to get my English students involved. I systematically allowed each interested student some time to work on the computers. It did not take long before the students were so used to having the computers operating that it was no longer a novelty.

I also set the mood by allowing game playing only before and after school. That policy eliminated many customers who were really only interested in playing Star Wars or Apple Invaders.

As far as my programming students were concerned, I had my regular customers from the previous year who had discovered that I again had computers in my room. I allowed them to work whenever I was in my room. Before long I was able to allow students to work even while I was teaching a regular English class.

I next worked to expand my list of customers.

As part of our CHALLENGE Program, we allow students proficient in basic skills in some classes to "test out" of basic skills units and undertake alternative projects. I began lobbying my teaching peers; I tried convincing them that computer programming was a great alternative project. Some, of course, were more receptive than others.

When I approached my own Language Arts Department, I found some willing teachers. (I think it was important that teachers thought they had a choice. They were not forced into having their students participate.)

I offered to take the students for four to six weeks to teach them--actually they would teach themselves--basic programming. The students would have to create a program of their own, preferably one on a topic agreeable to their English teachers. I also made this offer to teachers in other subject areas, but I have had only a few takers so far. Most of the teachers in other areas wanted their students to learn programming, they wanted them to develop programs in their subject areas, but they wanted them

to do it in addition to everything they were doing in the regular classroom.

Several language arts teachers, however, saw that there would be advantages to taking my offer. For one thing, if six students left one class of 30 to work with me, that class size was reduced to 24 for that period of four to six weeks. In addition, I would take the responsibility of grading these students for that time period, and these students would develop products that their peers could use.

This system worked well in language arts since our language component is skills oriented, and it was relatively easy to identify capable students. It also offered an interesting opportunity for students who had been quite bored in their mainstreamed classes without the necessity of the regular classroom teacher having to think of something different or extra for these students to do.

Unfortunately, I could only offer this during three periods of the day since my CHALLENGE part of the day was limited. As it was, I was using my preparation periods so that more kids could participate. Because of this limited part of my schedule that I could devote to the computers, some students were never able to make their schedules match mine. However, a few very diplomatic, creative students were able to convince their teachers that they should change classes so that they would have a study period when I was "free."

I also found that I had a room full of computer users after school again. If I had allowed it, they would have stayed every day well into the evenings.

By Thanksgiving I knew I was wearing out. I found myself helping students most of the time they were in my room after school, and then I had to spend an inordinate amount of time on my other school work at home.

I finally insisted that I had to leave by 3:30 each day--but if students wanted to come in the morning, I would be at school by 7:15.

I still have many students waiting to greet me in the morning. And students still make arrangements to stay in my room to work on the computers until 4:00--the time when the aide in charge of computers ends her day.

VI. Maintenance

And what about the problem of maintenance?

We have found that our microcomputers are quite durable. With the component parts, if a monitor or disk drive becomes inoperable, we just exchange that monitor or disk drive with another one. (Our computers get very heavy use. In addition to the use by our own students, the computers are used for teacher in-service courses, classes offered by state colleges, and evening courses for students.)

We also have had very good repair service. It has rarely been more than a matter of hours between the time I have reported a malfunction and the time the repair has been made. Considering the number and variety of computer operators, the computers do not seem to break down very often.

VII. Printers

I have one other new addition in my classroom this year--a printer. Unfortunately it is not one of the new, compact, silent printers. It is one that fits the atmosphere of a junior high--a noisy, large, converted teletype machine. It does serve its purpose, however; it allows students to have printouts of longer, complicated programs which makes debugging or editing much simpler for them--and for those of us who try to help them. I have found that a printer is really essential when students get beyond the first few lessons.

VIII. What Students Can Do

What can junior high students actually accomplish with a microcomputer? Really, quite a bit.

By the time they finish the five basic lessons, they can create a quiz that includes randomly selected questions, counters to keep track of scores, and graphics to make the programs more visually appealing. In addition, they often add their own brands of humor to responses making their programs more appealing to their fellow

students.

By the time they finish the intermediate lessons, they can program more refined graphics--with movement, they can add music or noises, and they can quite easily design programs with problems so complicated that I have to consult more experienced programmers for help.

For example, in one program, a fish comes nearer and nearer a hook as the program user answers questions correctly. If the user answers 12 of 15 questions correctly, the fish gets caught. If the user makes too many errors, the fish swims off. This happens to be a science program with questions about fish which was written by a seventh grader.

I have students who have created programs to go along with various subject areas in our school's curriculum--from grammar to mythology to science to math. I have students who are working on transferring such complicated games as Dungeons and Dragons and Gamma World to computer formats. I have a few students who are fairly proficient at translating programs written for Pet or TRS-80 computers to programs that will work on the Apple. I have students who have become computer artists. I have students with parents in business for themselves who are buying microcomputers for their businesses and who plan to use their sons or daughters as primary computer operators. I have students who have earned money in various businesses using their programming skills. I have students who love to alter ready-made games to suit their personal preferences; for example, they add or delete music or

noises, they change variables--there are as many variations of some games as there are students with that game on their personal disks. I even have students who add a subroutine to programs that responds with a short, written lecture if the program user types an obscene word on the screen! There seems to be no limit to their creativity.

And what do I do when I can't answer their questions?

I simply tell them "I don't know"--and try to find someone who does.

It is extremely important to be comfortable with students who know more than you do. I think working with students and computers can be extremely difficult for teachers who do not feel comfortable unless they know more than their students. That is hardly possible with computers. Quite often, before I find an answer to a student's problem in programming, the student figures it out. And what a great experience for a student to be able to teach the teacher!

I also have a growing library of computer reference books and magazines, and students who really want their programs to work are willing to do the necessary research.

This year I have not limited my computer operators to CHALLENGE students. Whenever a student comes to me with a sincere interest in learning programming, I try to work something out. I have had some students with learning disabilities find that the small steps

taken in programming are quite easy to understand.

I have also had students who give up. Several students start with enthusiasm only to discover that they can really only copy programs rather than devise programs of their own. Sometimes they quit, and sometimes they continue programming at a level comfortable for them.

And, of course, I have those who have quickly digested everything I have made available to them--as well as anything they could find for themselves. The only thing I can provide for them now is time.

In the future, however, I know we will have to be able to challenge the more capable programmers. Already many elementary school students in my district have the skills that my junior high students are only now acquiring.

In addition, computer literacy for all students is fast becoming an important issue.

Originally I had hoped to use students to teach other students about programming. The more advanced students are eager to do this, but they lack the skills necessary to make sure their pupils learn the programming in logical sequences and in small steps. Invariably they want to teach the new programmers the "tricks" they know how to make the computer perform.

So I have tried to compromise. I insist that when a student

begins programming, he or she has to work through the original five lessons. After that, the "advanced" programmers can work with them. After students have progressed beyond the beginning lessons, I have found that they can work very well together in devising or debugging programs.

IX. Other Uses, Concerns, and a Temporary Conclusion

In my other classes, I am also trying to make more use of the computers. Besides using grammar and spelling programs in English, I am beginning to use the computer's word processing capabilities to have students compose poetry and stories on the computer screen.

I basically believe that the computer is a language machine--not a math machine--and therefore, it is natural to use the computer as a writing tool. In addition, most of the writing that students read is printed rather than handwritten. So why not allow them to write using the computer? Students also seem to find it easier to locate spelling and grammar errors when they see them in print. They do not have to struggle to decipher someone's handwriting.

The computer as a word processor is also useful for my school newspaper. The computer makes editing stories much easier, and it can also justify margins. Students using the computer in this way can feel just like the reporters on "Lou Grant" who type their stories directly into a computer's memory.

As a result of the students' increased interest in computers, many

of our junior high students have shown an interest in learning how to type. One of my co-CHALLENGE teachers is now offering a typing class to students. We were able to find 12, old, standard typewriters that the high schools no longer wanted for their typing classes.

With the typing course, however, we have run into an unexpected problem. Our senior high business departments have been very unhappy that we are teaching the students to type. They think they will be losing customers for their classes because students will already have had typing in junior high.

Our course, though, is only the barest introduction. I believe many of the students taking it would never take a typing course in high school--they would be too busy with college-prep type courses. Our course may whet the appetites of others, and they may take a course that they previously would not have chosen. Most important, if we do not teach typing, the students teach themselves. When they are beginning to program and use computers in elementary school, I think it is foolish to tell them that they can't learn to type until high school.

And where do I go from here?

This summer I know that I want to learn more about programming. I have found the excitement of my students to be extremely contagious.

A few weeks ago, my principal asked me if I thought we now had

enough computers--or if I thought we should try to get even more for next year. I told him we needed more, of course. When he asked how many, I said, "Oh, at least a class set." And I honestly think that is really only a minimum.

Many of my students are from families who are purchasing their own computer systems for their homes. More and more students are interested in computers. More and more exciting possibilities exist. As educators of the future citizens of a much more technical world than our present world, I think we are lagging behind in computer education.

And as for next year, I don't know if I will get my "class set" of computers--I asked for a class set of literature books too--but I do know that we will add at least a few more computers to our present district inventory. And as more teachers "check out" computers for the summer and become more familiar with the possibilities that they present, I doubt that I will have the luxury of having six to eight computers almost to myself for the next school year.

I also know that I have to limit my time spent with students and computers before I am a victim of that much talked about "teacher burn-out." I also have to limit some students who spend far too much time on the computers; they do need a variety of experiences during their junior high years. But I also know that I won't stop being involved with computers.

As educators, I do not think we can afford to be uninvolved.

Perhaps we will make mistakes as we bring more and more computer use into our classrooms, but just as in programming a computer, one seldom does it perfectly the first time. And after numerous experiences of making errors in programming, maybe we can learn to be less intimidated by our fears of "being wrong."